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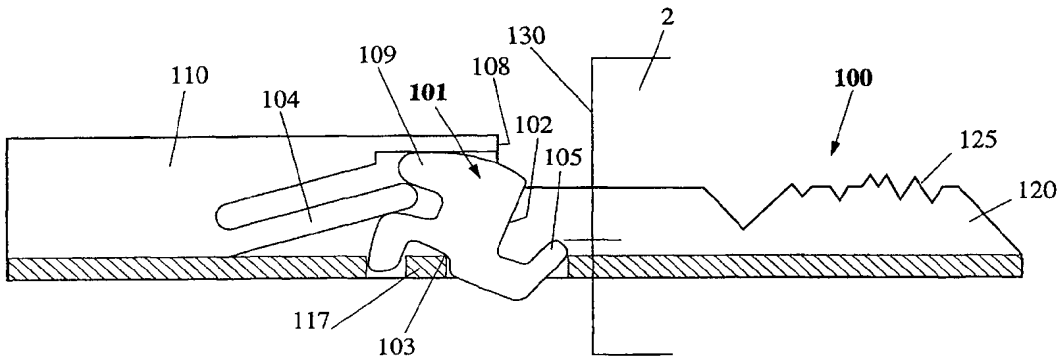

(57) Abstract

A key is provided with an actuator. The key also has an operation means and an interaction means. When the key is inserted into a lock, a force is applied to the operation means and the position of the interaction means is altered. The movement of the interaction means is used in the locking and/or un–locking mechanism of the lock. A key handle and lock are also provided which incorporate such a mechanism.

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MOVEABLE ELEMENT KEY AND KEY HANDLE AND LOCK

Technical Field

The present invention relates to an improved key, key handle and lock.

Background Art

Prior art sidebar locks include a cylindrical plug which is mounted into an outer housing or shell in which the plug rotates. The shell is mounted in a suitable latch structure. The plug is locked within the shell by interference between the shell and the plug. This locked state occurs when sidebars from the plug are extended into sidebar grooves located along the sides of the shell. This prevents the plug from rotating with respect to the shell.

The locks are provided with sidebar pins which are directed from the sidebars and which protrude towards the interior of the plug. When the lock is in a locked condition, the sidebar pins do not align with complementary holes in tumblers that are located in the plug. Consequently, unless a correct key is inserted, the sidebar cannot be withdrawn into a sidebar slot which runs the length of the plug. When the correct key is inserted, the tumblers are simultaneously raised to varying degrees so that the tumbler holes are aligned with the sidebar pins. Consequently, the sidebars are able to be received into the slots in the side of the plug, thus no longer acting as an obstacle to the rotation of the plug within the shell. Hence, the lock assumes an unlocked state because the sidebars no longer act as obstacles to the rotation of the plug.

Although such locks afford a high degree of security, it would be desirable if the resistance of the lock to unauthorised unlocking was increased even further.

It is an object of the present invention to provide any one of: a high security key, a handle for such a key, and a complementary lock which is operated by such a key.

Summary Of The Invention

According to a first aspect of the present invention, there is provided a key including an actuator which has an operation means and an interaction means, the arrangement being such that operatively, if the key is inserted into a lock, a force is applied to the operation means and the position of the interaction means

is altered.

Preferably, the key is operatively adapted such that the force applied to the operation means is supplied by the manual force which a user exerts in inserting the key through the opening of the lock.

Preferably, the alteration of the position of the interaction means is achieved by the actuator being rotatable relative to the body of the key.

Alternatively, the alteration of the position of the interaction means may be achieved by the actuator being pivotable relative to the body of the key.

Preferably, the operation means comprises a part of the actuator positioned and adapted to be forced against a face of the lock during lock insertion.

Preferably, the interaction means is operatively adapted to interact with the lock in a locking or unlocking action therefor, the alteration of the position of the interaction means being part of the locking or unlocking action.

Preferably, the interaction means is arranged and operatively adapted such that, upon key insertion, the interaction means is substantially positioned within the lock.

Preferably, the interaction means comprises a protrusion from the actuator.

Preferably, the key is provided with a key blade, the actuator being positioned alongside the blade.

The key may be provided with at least two blades, and the actuator may be aligned along a plane lying between the two blades.

Each blade may be connected to a handle portion of the key, and the operation means of the actuator may be substantially shielded by the handle portion, while the interaction means may be shielded at least partly by the blade portions.

Preferably, the blade or each of the blades further includes teeth for operation of lock tumblers.

Preferably, the key further includes a biasing means for biasing the actuator into a first position when the key is not inserted into a the lock.

Preferably, in said first position, a part of said operation means protrudes

beyond a surface of the key, such that said part is operatively adapted to abut the face of the lock upon lock insertion.

According to a second aspect of the invention, there is provided a key handle including an actuator which has an operation means and an interaction means, wherein, upon applying a force to the operation means, the position of the interaction means is altered, the key handle being adapted for a key blade to be attached thereto to form a key which is operatively adapted to be inserted through an opening in a face of a lock.

According to a third aspect of the invention, there is provided a lock for operation by a key, said key including a moveable actuator having an operation means and an interaction means, said lock including an interference means responsive to the interaction means to release the lock.

Preferably, the interference means includes a blocking element that obstructs part of the lock so as to prevent the occurrence of a step that is necessary for the unlocking of the lock.

In an embodiment, the interference means comprises a relocker bar supported by an anvil, the anvil being responsive to the interaction means to raise and lower the relocker bar so that in, a locked position, the relocker bar obstructs sidebar grooves of the lock while, in an unlocked position, the relocker bar is clear of the sidebar grooves.

Preferably, the lock further including tumblers responsive to teeth located on a blade of the key for moving the tumblers from a position where the tumblers prevent rotation of a plug of the lock relative to a shell surrounding said plug.

According to a fourth aspect of the invention, there is provided a security system including :

a) a key including an actuator means, having an operation means and an interaction means, wherein upon applying force to the operation means the position of the interaction means is altered; and

b) a lock for operation by the key including an interference means for locking a plug of the lock to a surrounding lock shell, said interference means being responsive to the interaction means for unlocking of said lock.

According to a fifth aspect of the invention, there is provided a security

system including :

a) a key as described above; and

b) a lock as described above;

wherein the actuator of the key interacts with the interference means of the lock, such that the alteration of the position of the interaction means of the key causes an alteration of the position of the interference means of the lock so as to achieve unlocking of the lock.

Brief Description of the Drawings

In order that the invention might be more fully understood, embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 illustrates an exploded view of a prior art lock;

Figure 2 illustrates a cross-sectional view of an embodiment of a key showing the orientation of an actuating member when the key is not inserted into a lock;

Figure 3A illustrates a cross-sectional view of the key of Figure 2 showing the orientation of the actuating member when the key is inserted into the lock;

Figure 3B illustrates an exploded view of an embodiment of a key having an actuator;

Figure 3C illustrates the embodiment of the key of Figure 3B in an assembled state;

Figure 3D illustrates an embodiment of a key handle having an actuator in which a key blade has not yet been attached to the key handle;

Figure 4A illustrates an embodiment of a lock component which is operable by the key of Figure 2;

Figure 4B is the lock component of Figure 4A illustrated with the internal configuration shown in outline;

Figure 5 illustrates a relocker bar which is used for locking and unlocking the lock component of Figures 4A and 4B;

Figure 6A shows a lock with the lock component of Figure 4A illustrated with the relocker bar of Figure 5 located within the plug of the lock;

Figure 6B shows a cross-section of the lock of Figure 6A, taken along a

plane that passes through A-A of Figure 6A;

Figure 7 illustrates an exploded view of a further embodiment of a lock which varies from the embodiment of Figures 4A to 6B in that the further embodiment has a relocker bar having only a single sidebar and only a single interference element;

Figure 8 is a further exploded view of components of the lock of Figure 7; and

Figure 9 is a detailed view of the embodiment of the relocker bar used in the lock of Figure 7.

Description of the Embodiments

The present embodiment will be discussed in the context of a prior art Bilock ™ device manufactured and sold by the applicant. These prior art devices make use of dual bladed keys for high security applications. Referring to Figure 1, there is depicted a prior art plug lock 1. The lock 1 has a removable plug 2 which is slideably received in a longitudinal cavity 3 of a housing 4. The plug 2 has a keyway 5 and a plurality of tumbler bores 6. The tumbler bores 6 are aligned with the keyway 5 and are receptive to pin tumblers 7. The tumblers 7 are inwardly biased in the tumbler bores 6 by tumbler springs 8 which, in turn, are secured in the bores 6 by a cover 9. The tumblers 7 are each provided with a transverse tumbler pin hole 10 as is known in the art of sidebar locks. On either side, the plug 2 is provided with a longitudinally disposed sidebar recess 11. Each recess 11 is adapted, when the lock is in an unlocked state, to accommodate a sidebar 12. The sidebars 12 include a series of pins 13 disposed along the side of the sidebar. The pins 13 face the plug 2. The sidebars 12 are biased away from the plug 2 by sidebar springs 14 or by other biasing means known in the art. A series of transverse bores 15 are provided along the length of each of the sidebar recesses 11. The transverse bores 15 pass through the plug 2.

When the blade 16 of a correct key 17 is inserted into the keyway 5, the transverse bores 15 each communicate with the tumbler bores 6, and match up with the pin holes 10 on the tumblers. This allows the sidebar 12 to be withdrawn into the sidebar recess 11 when sufficient force is applied to

overcome the sidebar springs 14. This force may be applied when the user exerts a rotational torque on the plug by rotating the inserted key 17, such that the sidebars 12 are forced into the sidebar recesses 11 as a result of radial forces exerted on the sidebars. The radial forces arise from the angled sides of sidebar slots 18 found in the housing 4. Consequently, the lock 1 is said to be in an unlocked state when the sidebars 12 are positioned generally within the sidebar recesses 11 to the extent that the sidebars 12 no longer hinder the rotation of the plug 2 within the cavity 3.

Figure 2 shows a cross-sectional view of an embodiment of a key 100. The key 100 includes a blade 120 and a handle part in the form of handle portion 110. The key is operatively adapted to be inserted through an opening or keyway in a face 130 of a lock. The blade 120 of the key is provided with teeth 125 which are intended for interactive operation of lock tumblers (not shown) found in the lock. In the embodiment, the blade 120 is preferably free from holes or apertures in the upright faces of the blade, since such holes would act as areas of weakness or of stress concentration.

The key 100 includes an actuator which is embodied in the form of an actuator piece 101. In the embodiment in Figures 2 to 3C, the actuator piece 101 is shown as part of the key 100 which has dual blades 120. In such a dual-bladed embodiment, the actuator piece 101 is positioned between the two blades 120.

The actuator has an operation means and an interaction means. The operation means comprises a part of the actuator which, in the present embodiment, is in the form of an edge 102 of the actuator piece 101 that is adapted to receive an applied force. The actuator edge 102 is arranged and adapted to be forced against the face 130 of the lock when the key 100 is inserted into the lock. In the embodiment, the interaction means is in the form of a protrusion from the actuator in the form of anterior horn 105. When a force is applied to the edge 102 of the actuator piece, the force causes the position of the horn 105 to be altered.

As a result of the movement of the actuator, the position of the interaction means is altered. For example, in the embodiment, the movement of the actuator

piece 101 causes the alteration of the position of the horn 105.

The actuator piece 101 is able to pivot relative to the body of the key 100. In the embodiment of Figure 2, the actuator piece 101 pivots freely about an edge 103 of the transverse spine segment 117. In alternative embodiments, the actuator may rotate relative to the key body, rather than merely pivot.

The key includes a biasing means for biasing the actuator into a first position when the key is not inserted into the lock. Figure 2 shows the actuator piece in a first position. A biasing means, in the form of resilient tongue 104, contacts and urges the actuator piece back towards the first position during lock insertion such that, when the key is withdraw from the lock, the actuator returns to the first position. The resilient tongue 104 pushes upwards on an arm 109 of the actuator piece. Thus, prior to insertion of the key 100 into the lock, the resilient tongue 104 forces the actuator piece 101 to pivot clockwise about the transverse edge 103. In this first position, prior to full insertion of the key, the anterior horn 105 of the actuator piece 101 assumes a low profile suitable for entry into the keyway of the lock, as seen in Figure 2. The resilient tongue may be formed, for example, of a suitable plastic material.

In Figure 3A, when the user forcibly inserts the key 100 into the lock, the edge 102 of the actuator piece abuts the lock face 130. Thus, the force of inserting the key causes the edge 102 of the actuator piece to exert a force on the lock face 130. Concurrently, there is a equal and opposite reaction force from the lock face 130 that acts against the edge 102 of the actuator piece. Thus, the edge 102 of the actuator piece is said to be operatively adapted to receive the reaction force applied by the surface of the lock face 130. This reaction force, acting on the edge 102 of the actuator, causes an alteration in the position of the interaction means, which is embodied as the horn 105. The face 130 of lock forces the actuator piece 101 to rotate or pivot counter-clockwise about the edge 103. This occurs as and when the force created by the insertion of the key by the user is sufficient to overcome the biasing force of the resilient tongue 104. Consequently, as the actuator piece rotates counter-clockwise, this causes the position of the horn 105 to be altered. Thus, the horn 105 rises up through a distance Y, as indicated in Figure 3A. Hence, the horn 105 functions as a

moveable element that is adapted to interact with a mechanism of the lock. The role of the actuator is to provide the movement so that the position of the interaction means, for example the horn 105, can be altered.

The purpose of the interaction means is to provide a moving element that can interact, in some manner, with the mechanism of the lock. This provision of a moving element on the key, or key handle, enables locks to be designed with mechanisms that can only be fully activated when the interaction means is brought into play with the lock mechanism.

A principle underlying the design of the embodiment in Figures 2 and 3A is that rotational or pivotal motion of the actuator piece 101 causes the horn 105 to move in a manner that is transverse to the longitudinal axis of the key. In Figure 3A, this transverse movement of the horn 105 is spanned by distance Y. Thus, this transverse movement, of the interaction means, may be designed to participate in the locking and/or un-locking mechanism of the lock. It is appreciated that an unauthorised user, such as a burglar, may more readily replicate a motion in the lock that is activated by a force acting parallel to the longitudinal axis, for example, by inserting a long rod into the keyway. However, it may not be as easy for the unauthorised user to replicate a motion that is activated by a force acting transverse or perpendicular to the longitudinal axis.

Furthermore, in the embodiment, the horn 105 is able to exert a transverse force which may be equivalent to the force applied by the user when inserting the key into the lock, as explained above. This is because the force of key insertion is used to move the actuator which, in turn, causes the interaction means to move in the transverse manner. This leads to an advantage that the transverse force, offered by the interaction means, may be greater than some of the transverse forces that have been effected in the prior art. In the prior art, transverse motions inside the lock have been effected by internal springs or the like that may not offer as much force as that which is offered by the interaction means of the present embodiment, which is activated by the force of key insertion. The transverse force offered by the interaction means, such as the horn 105, enables lock designers to create locking mechanisms that incorporate larger components for or in the lock which must be moved by the transverse

force. Later in the specification, embodiments of lock will be described with reference to Figures 6A and 7 which include components that require a relatively large force to be moved.

Since the interaction means is intended to interact with the lock mechanism, the interaction means must be arranged such that, upon key insertion, the interaction means will be preferably be within the lock. In this embodiment, the interaction means, formed as the horn 105, protrudes beyond the face 108 of the handle portion 110, as shown in Figure 2. Hence, when the key 100 is inserted into the lock, the face 108 of the handle portion abuts against the lock face 130. Thus, the fact that the horn 105 protrudes beyond the face 108 of the handle portion means that the horn 105 is inserted into the interior of the lock, and the alteration of the position of the horn 105 can participate in the internal operation of the lock.

In Figure 2, the body of the actuator piece 101 is substantially shielded by the handle portion 110. However, the operation means, formed as the edge 102 of the actuator piece, protrudes slight beyond the face 108 of the handle portion, as seen in Figure 2. This is so that the edge 102 of the actuator piece will be able to abut the lock face 130 during key insertion.

In other embodiments, the interaction means, which is preferably supported by the key handle, may be called upon to interact with an external mechanism that is located outside the lockface. In such other embodiments, the interaction means - for example the horn 105 - need not protrude beyond the face 108 of the handle portion. Instead, the external mechanism of the lock would penetrate the key handle to interact with the interaction means of the key. However, in such other embodiments, the external mechanisms of the lock would be exposed to damage. For this reason, the earlier described embodiment, where the interaction means enters the lock, is preferred over the other embodiments where the lock mechanism, which interacts with the interaction means, is external or outside of the lock face.

In the embodiments in Figures 2 to 3C, the keys are provided with two or more blades. The plane of the actuator lies alongside one of the blades, and preferably is aligned along a plane which lies between two of the blades 120,

and/or between two walls of the handle portion 110. This allows the movement of the actuator piece 101 to be shielded by planar surfaces of the key. For example, in Figure 2, the body of the actuator piece 101 is substantially shielded by the surfaces of the handle 110, and the horn 105 is substantially or at least partially shielded by the surfaces of the blades 120. Thus, the actuator piece 101 receives a degree of protection from damage, which extends its life span.

In Figure 3D, a further embodiment of the invention is illustrated which is in the form of a handle portion 110 having an actuator piece 101. No blade portion is attached. In all respects, the handle portion 110 in Figure 3D is the same as the one illustrated in Figures 2 and 3A, except that a blade portion 120 has not yet been attached. This embodiment shows that the invention may be embodied as a handle portion having an actuator, with the intention that the user, such as a locksmith or end user, will subsequently attach a blade portion. The blade portion may be of a conventional design, and all the features of the embodiments may be found only on or supported by the handle portion. Hence, the invention in its broadest aspect is not limited to having a blade portion, since the user may attach a conventional blade portion.

Embodiments will now be described of locks that are capable of interacting with the interaction means of embodiments of keys or key handles, such as the ones described above.

Figure 4A illustrates an embodiment of a lock which contains a mechanism that is locked and/or unlocked as a result of interaction with an interaction means found on embodiments of keys or key handles of the type described above.

A comparison is made between the embodiment of Figure 4A in contrast to the prior art lock of Figure 1. (Like parts are designated with like numerals, both in the prior art and in the embodiment, only for ease of understanding the present embodiment). In contrast to the prior art of Figure 1, the lock in Figure 4A is provided with a passage 203 (best seen in Figure 6B). The passage 203 extends transverse to the longitudinal axis of the plug, extending from one sidebar groove 11 to the other side bar groove 11 on the other side of the plug.

In Figure 4A, the lock plug 2 is provided with an interference means in a

form which includes two discs 212, 213, which are more clearly seen in Figure 5. In Figure 5, the discs 212, 213 are connected by a crossbar 211 which, together with the discs, form a relocker bar 209 which has an appearance of a dumbbell. The relocker bar 209 is provided with a downwardly depending post or support 214. The crossbar 211 is engaged by the head of an anvil 221.

In Figure 4A, when the discs 212, 213 are moved up into the passage 203, the discs in this upper position do not obstruct the sidebar grooves 11. However, when the discs 212, 213 are moved down into the sidebar grooves 11 (as shown in Figure 6B), the discs obstruct and prevent the sidebars 12 from entering the sidebar grooves 11. Thus, when the discs are in this lower position, the lock is said to be in a locked position. Hence, the movement of the discs 212, 213 of the relocker bar 209 is an integral part of the locking and unlocking mechanism of the lock. As will be described, the movement of the discs is achieved by interaction with an interaction means of an embodiment of a key similar to the type described above.

The transverse movement of the horn 105, found on the actuator piece of the key in Figure 2, is used to impart the upward and downward movement of the discs 212, 213. In order to enable the horn 105 to impart motion to the discs 212, 213, the lock is provided with a passageway through which the interaction means of the key is able to interact with the interference means of the lock. In Figure 4B, the passageway in the preferred embodiment includes a vertical or upright channel 215. The vertical channel 215 communicates with the passage 203. The upper opening 208 of the vertical channel 215 begins at a lower surface in the passage 203, and extends down to the base of the keyway ridge 217, forming a lower opening 216 for the channel 215. In Figure 6A, when the relocker bar 209 is installed in the plug 2, a biasing spring 225 is included for biasing the discs 212, 213 of the anvil and the relocker bar 209 downwardly towards the locking position.

In Figure 6A, the relocker bar 209 is shown positioned within the plug lock of Figures 4A. The lock is operated by the key of Figure 2, as will now be described. The horn 105 (of Figure 2) is able to move within the lock, inside the upright channel 215. Inside this upright channel, the post 214 of the relocker bar

209 is also positioned, such that in the confines of the channel 215, the tip of the horn 105 is able to abut up against the base of the post 214. The post 214 of the anvil 221, shown in Figure 5, is dimensioned to be received into the vertical channel 215.

Referring to Figures 6A and 6B, in the locked position, the sidebars 12 are urged away from the plug 2 such that the sidebars engage in grooves 220, 222 in the shell 4, in a similar manner as in the prior art lock of Figure 1. However, in the embodiment of Figure 6A which is shown in the locked position, the biasing spring 225 forces the relocker bar 209 downwards so that the discs 212, 213 obstruct the sidebar grooves 11. Thus, in the locked state, the discs 212, 213 of the relocker bar sit at least partially in the grooves 11, and thereby prevent the sidebars 12 from returning into the grooves 11. Accordingly, the discs 212, 213 at least partially fill the sidebar grooves 11 so that, even if force is applied to the key in an attempt to rotate the plug 2 relative to the cavity 3 of a housing 4, there is no possibility that the sidebars 12 will retract back into the sidebar grooves 11. Therefore, when the relocker bar 209 assumes the lower position, as illustrated in Figure 6A, rotation and hence unlocking of the plug is prevented.

In order to rotate the plug 2 within the cavity 3, it is necessary that the relocker bar 209 be raised up out of the way, so that the discs 212, 213 will no longer obstruct the sidebar grooves 11. To effect this unlocking, the key of Figure 2 is inserted into the keyway 5 of the plug. The actuator piece 101 is forced against the face 130 of the lock. This causes the horn 105 to be raised through the vertical channel 215, so that the horn 105 thereby forces the post 214 of the relocker bar upwards.

The upward movement of the relocker bar 209 lifts and forces the discs 213 and 212 upwards into the housing recesses 227, 229 of the passage 203, so that the discs no longer obstruct the sidebar grooves 11. It is then simply a matter for the user to apply a rotational force to the lock by means of the key, in order to force the sidebars 12 against the grooves 220, 222 of the shell 4. This causes the sidebars 12 to be retracted into sidebar grooves 11 of the plug. While the operation of the lock tumblers has not been explained in relation to

the operation of the lock of Figure 4A, preferably the lock includes tumblers and associated components, whose operation is standard and similar to that described in relation to the prior art lock of Figure 1.

In another embodiment of a lock, illustrated in Figures 7 to 9, an interference means is used that differs from the relocker bar of Figure 5 in that, rather than having two discs, only one interference element is used. Here, the interference element is in the form of a block 212. Also, although the shape or design of the components of this other embodiment differ from the embodiment of Figure 6A, the function remains the same. Since only one interference element is used, there is only need for one sidebar groove 11C, and one sidebar 12C.

Figure 8 shows an exploded view of a cover 300 which is removeable to reveal the inner passage 203 and upright channel 215. Once the components of the block 212 and support 214 are placed within the plug 2, the cover 300 is used to seal the opening of the plug. Figure 9 illustrated the further embodiment of the relocker bar in an assembled state.

An underlying principle of the embodiments is to provide a mechanism, included in a key or supported by the key handle, which is able to impart a motion that can interact with the locking mechanism of the lock. Embodiments have been described in which the actuator imparts a transverse motion to the interaction means, and it will be evident to those skilled in the art that other actuators may be conceived that can impart a similar motion to the interaction means. Hence, the invention in its broadest aspect is not limited to the shape and configuration of the actuator piece 101 illustrated in Figures 2 or 3D.

Furthermore, in the preferred embodiments, the plane of the actuator piece is parallel to the side walls of the key blades, but in other embodiments, the plane of the actuator may be transverse to the plane of the key blades.

The key in Figure 2, and the lock of Figures 6A or 7, combine together to form an embodiment of a security system in which the actuator of the key interacts with the interference means of the lock, such that the alteration of the position of the interaction means of the key causes an alteration of the position of the interference means of the lock, so as to achieve unlocking of the lock.

Although only two embodiments of locks, which are complementary to a key according to an embodiment of the invention, have been explained, it is noted that other designs will be apparent to those skilled in the art. For example, according to another embodiment, the horn of the actuator piece might push a tumbler in order to position it so that it does not interfere between the plug and shell. Similarly, the key could be of other designs. For example, the operative force may be applied to a moveable element by squeezing, rotating or pushing the handle of the key, rather than by forcing the actuator against the face of the lock. The invention may be embodied in a key with only one blade, rather than two or more blades. In such cases, the interaction means may be inside the single blade, or alongside the blade. Furthermore the moveable element might slide or alternatively move along a curved track, rather than rotate or pivot. As seen in Figures 3B and 3C, the external appearance of the key handle may be modified without affecting the function of the mechanism of the invention. Accordingly, the appended claims should be interpreted broadly and are not limited to the preferred embodiments described hereinbefore.

CLAIMS:

1. A key including an actuator which has an operation means and an interaction means, the arrangement being such that operatively, if the key is inserted into a lock, a force is applied to the operation means and the position of the interaction means is altered.

2. A key according to claim 1 wherein the key is operatively adapted such that the force applied to the operation means is supplied by the manual force which a user exerts in inserting the key through the opening of the lock.

3. A key according to claim 1, wherein the alteration of the position of the interaction means is achieved by the actuator being rotatable relative to the body of the key.

4. A key according to claim 1, wherein the alteration of the position of the interaction means is achieved by the actuator being pivotable relative to the body of the key.

5. A key according to claim 1, wherein the operation means comprises a part of the actuator positioned and adapted to be forced against a face of the lock during lock insertion.

6. A key according to claim 1 wherein the interaction means is operatively adapted to interact with the lock in a locking or unlocking action therefor, the alteration of the position of the interaction means being part of the locking or unlocking action.

7. A key according to claim 1 wherein the interaction means is arranged and operatively adapted such that, upon key insertion, the interaction means is substantially positioned within the lock.

8. A key according to any one of the preceding claims, wherein the interaction means comprises a protrusion from the actuator.

9. A key according to any one of the preceding claims wherein the key is provided with a key blade, the actuator being positioned alongside the blade.

10. A key according to claim 9 wherein the key is provided with at least two blades, the actuator being aligned along a plane lying between the two blades.

11. A key according to claim 10 wherein each blade is connected to a handle portion of the key, the operation means of the actuator being substantially shielded by the handle portion, while the interaction means is shielded at least partly by the blade portions.

12. A key according to any one of claims 9 to 11, wherein the blade or each of the blades further includes teeth for operation of lock tumblers.

13. A key according to any one of the preceding claims wherein the key further includes a biasing means for biasing the actuator into a first position when the key is not inserted into a the lock.

14. A key according to claim 13 where, in said first position, a part of said operation means protrudes beyond a surface of the key, such that said part is operatively adapted to abut the face of the lock upon lock insertion.

15. A key handle including an actuator which has an operation means and an interaction means, wherein, upon applying a force to the operation means, the position of the interaction means is altered, the key handle being adapted for a key blade to be attached thereto to form a key which is operatively adapted to be inserted into a lock.

16. A key handle according to claim 15 wherein the key handle is operatively adapted such that the force applied to the operation means is supplied by the manual force which a user exerts in inserting the key into the lock.

17. A key handle according to claim 15, wherein the alteration of the position of the interaction means is achieved by the actuator being rotatable relative to the body of the key handle.

18. A key handle according to claim 15, wherein the alteration of the position of the interaction means is achieved by the actuator being pivotable relative to the body of the key handle.

19. A key handle according to claim 15, wherein the operation means comprises a part of the actuator positioned and adapted to be forced against the face of the lock during lock insertion of the key.

20. A key handle according to claim 15 wherein the interaction means is operatively adapted to interact with the lock in a locking or unlocking action therefor, the alteration of the position of the interaction means being part of the locking or unlocking action.

21. A key handle according to claim 15 wherein the interaction means is arranged and operatively adapted such that, upon key insertion into the lock, the interaction means is substantially positioned within the lock.

22. A key handle according to any one of claims 15 to 21, wherein the interaction means comprises a protrusion from the actuator.

23. A key handle according to any one of claims 15 to 22 wherein, when the key blade is attached thereto, the actuator is positioned alongside the key blade.

24. A key handle according to claim 23 wherein two key blades are attachable to the key handle such that the actuator is aligned along a plane lying between the two key blades.

25. A key handle according to claim 24 wherein, when each blade is connected to the key handle, the operation means of the actuator is substantially shielded by the key handle, while the interaction means is shielded at least partly by the key blades.

26. A key handle according to any one of claims 15 to 25, wherein the blade or each of the blades further includes teeth for operation of lock tumblers.

27. A key handle according to any one of claims 15 to 26 wherein the key handle further includes a biasing means for biasing the actuator into a first position when no force is applied to the operation means

28. A key handle according to claim 27 wherein, in said first position, a part of said operation means protrudes beyond a surface of the key handle, such that said part is operatively adapted to abut the face of the lock upon lock insertion.

29. A key handle according to any one of claims 15 to 28 wherein the key handle includes one or more handle parts which combine to form a handle body graspable by the user, the key blade being adapted to fit into the handle body.

30. A key handle according to any one of claims 15 to 29 wherein the key handle includes resilient retaining means for retaining a moveable element in the key handle, the moveable element including said operation means and said interaction means.

31. A lock for operation by a key, said key including a moveable actuator having an operation means and an interaction means, said lock including an interference means responsive to th@ interaction means to release the lock.

32. A lock according to claim 31, wherein the interference means includes a blocking element that obstructs part of the lock so as to prevent the occurrence of a step that is necessary for the unlocking of the lock.

33. A lock according to claim 31, wherein the interference means comprises a relocker bar supported by an anvil, the anvil being responsive to the interaction means to raise and lower the relocker bar so that in, a locked position, the relocker bar obstructs sidebar grooves of the lock while, in an unlocked position, the relocker bar is clear of the sidebar grooves.

34. A lock according to any one of claims 31 to 33, further including tumblers responsive to teeth located on a blade of the key for moving the tumblers from a position where the tumblers prevent rotation of a plug of the lock relative to a shell surrounding said plug.

35. A security system including :

a) a key including an actuator means, having an operation means and an interaction means, wherein upon applying force to the operation means the position of the interaction means is altered; and

b) a lock for operation by the key including an interference means for locking a plug of the lock to a surrounding lock shell, said interference means being responsive to the interaction means for unlocking of said lock.

36. A security system including:

a) a key according to any one of claims 1 to 14; and

b) a lock according to any one of claims 31 to 34;

wherein the actuator of the key interacts with the interference means of the lock, such that the alteration of the position of the interaction means of the key causes an alteration of the position of the interference means of the lock so as to achieve unlocking of the lock.

37. A key substantially as hereinbefore described and illustrated with reference to the accompanying drawings, excluding Figure 1.

38. A key handle substantially as hereinbefore described and illustrated with reference to the accompanying drawings, excluding Figure 1.

39. A lock for operation by a key, said key including a moveable actuator having an operation means and an interaction means, said lock substantially as hereinbefore described and illustrated with reference to the accompanying drawings, excluding Figure 1.

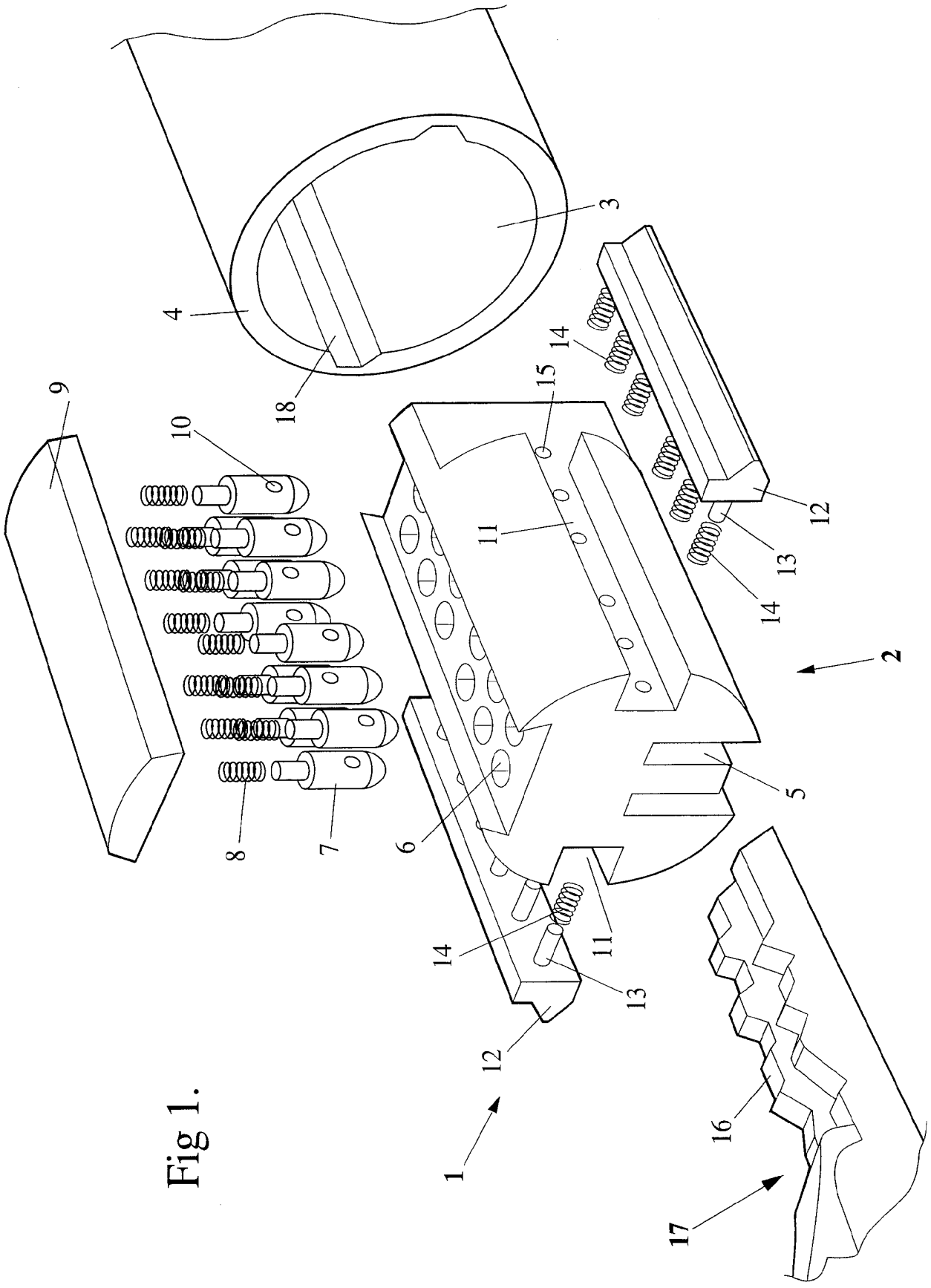

Fig 1.

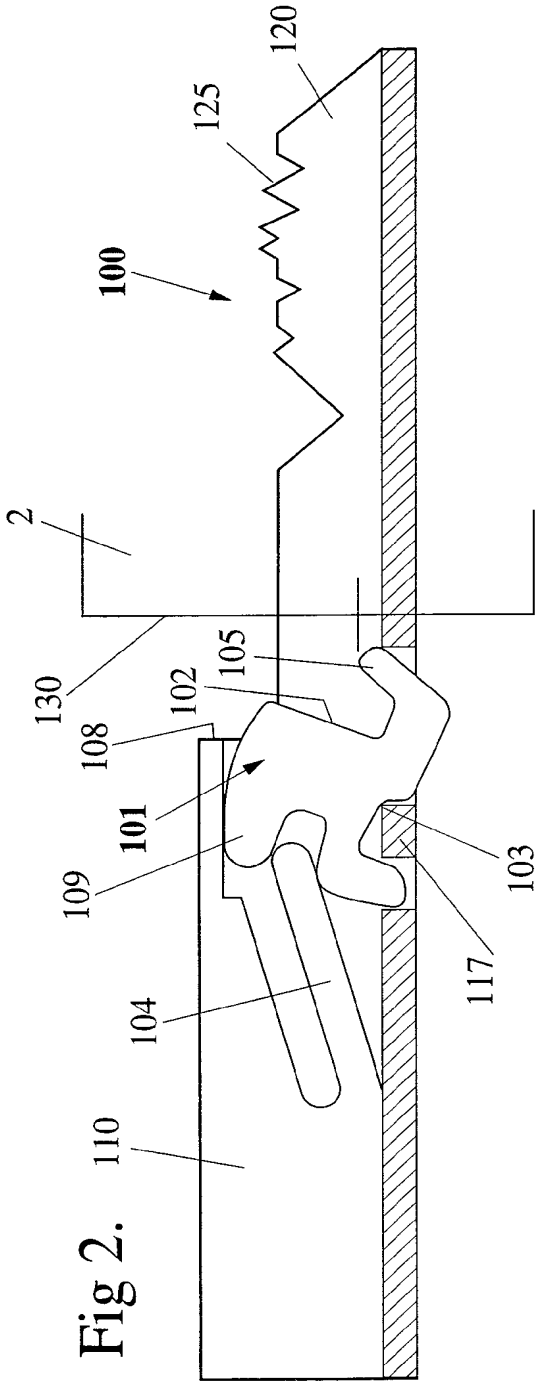
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Fig 2.

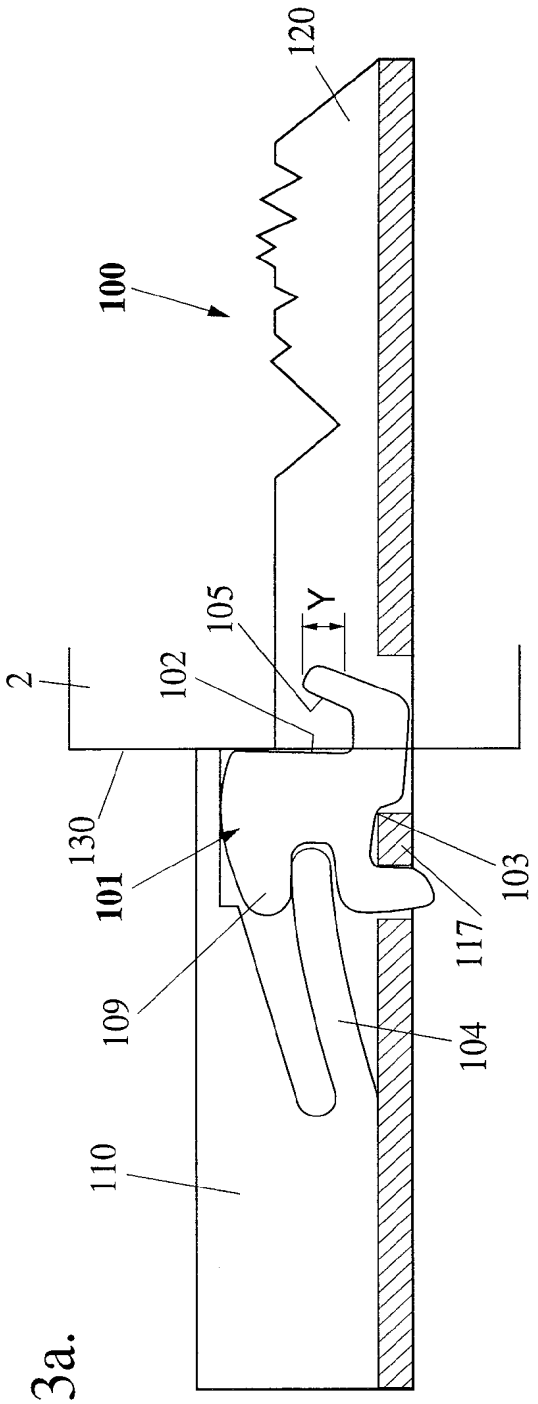
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Fig 3a.

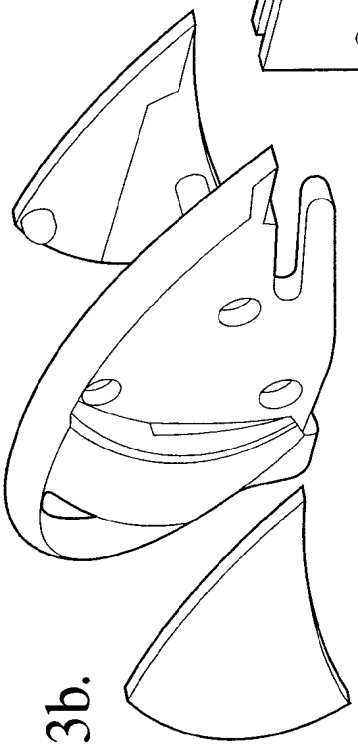
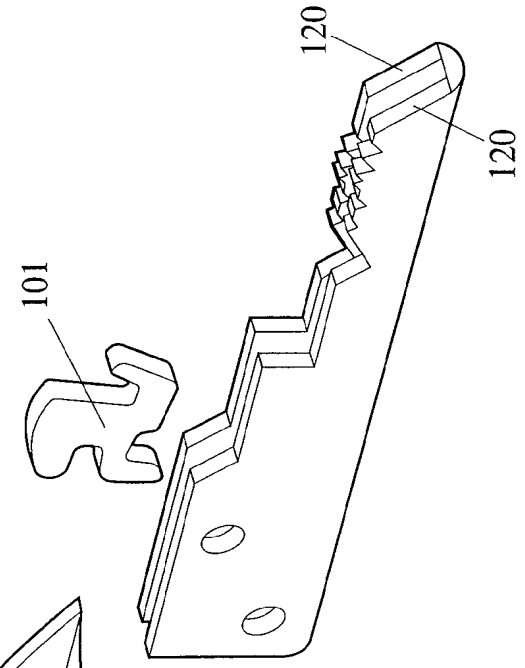


Fig 3b.



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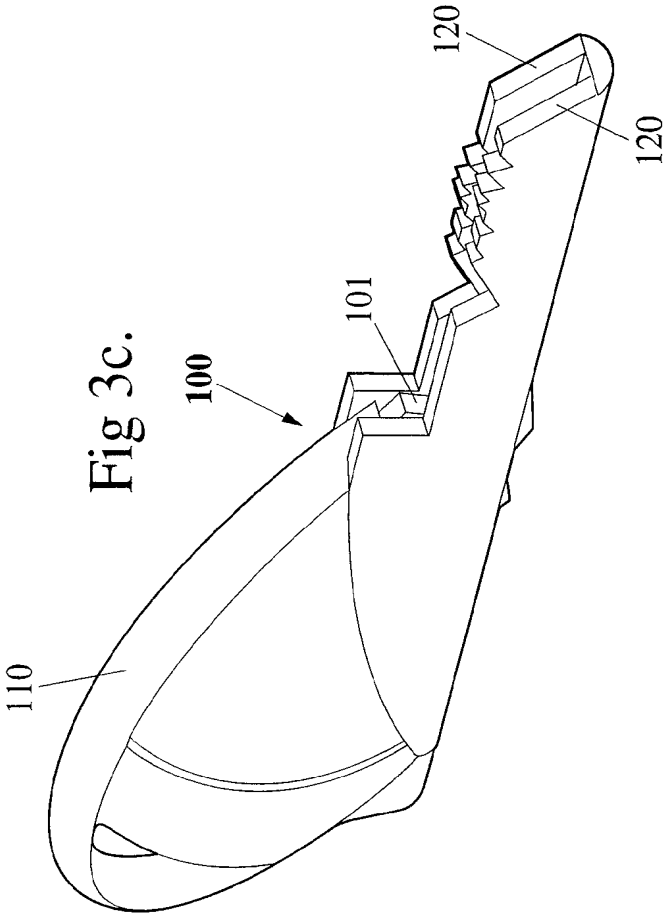
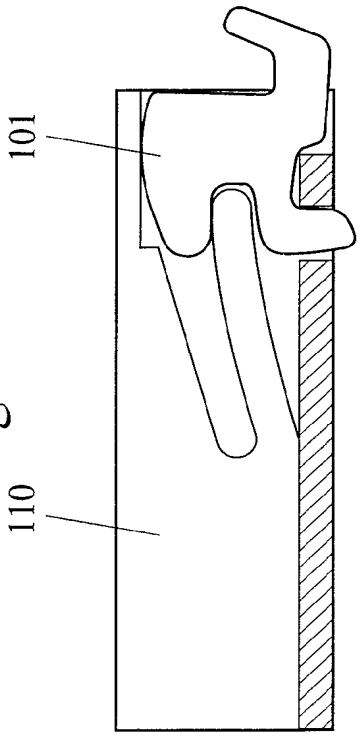


Fig 3d.



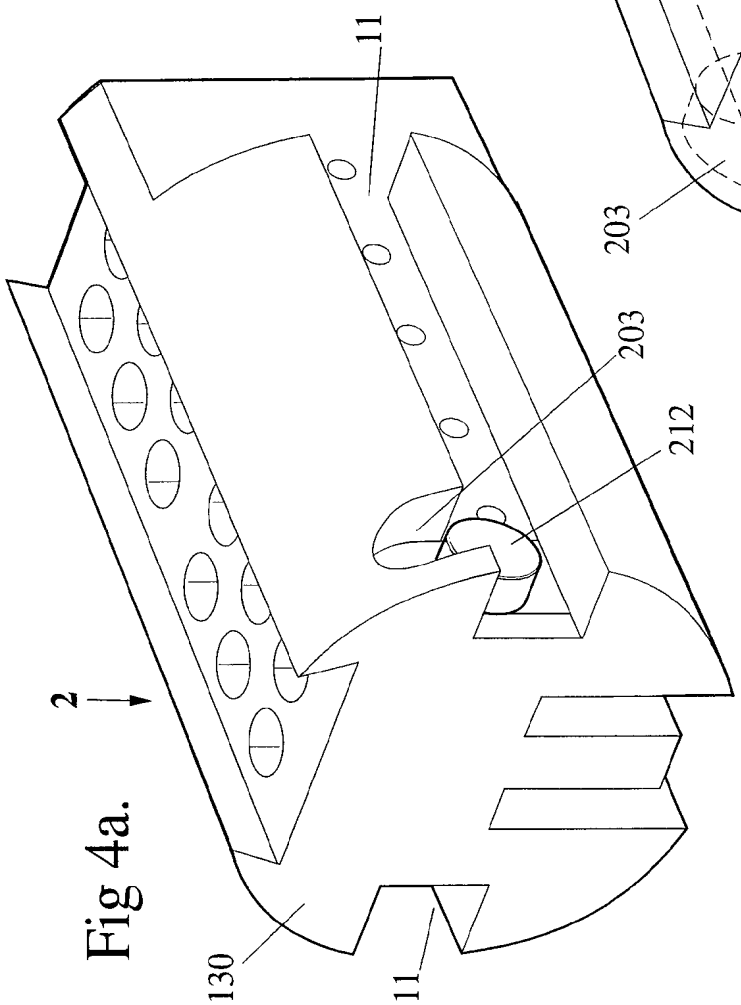


Fig 4a.

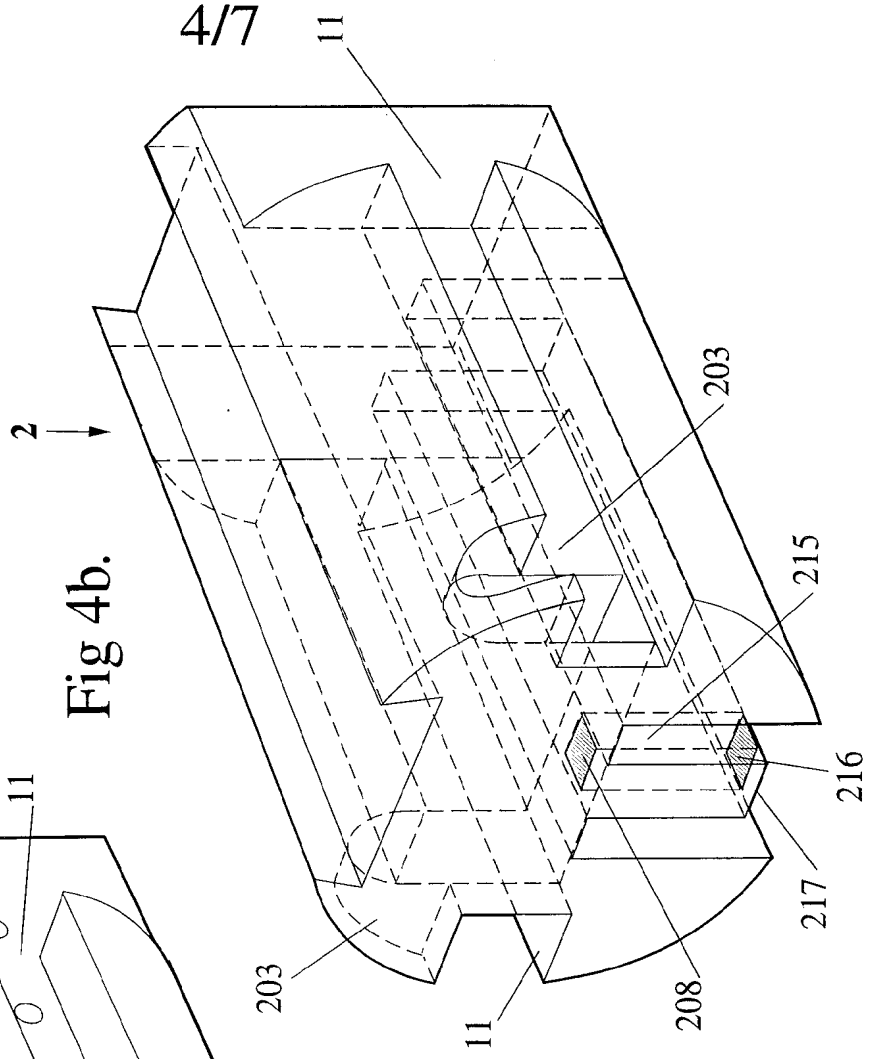
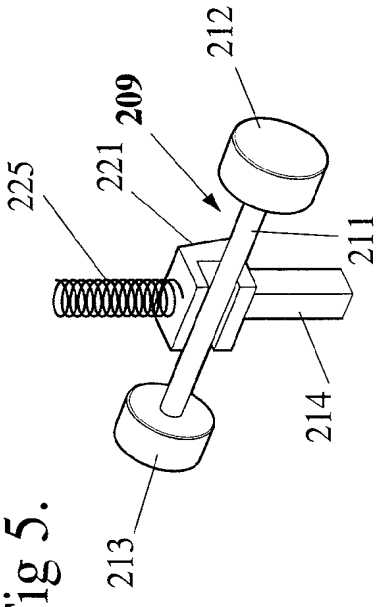


Fig 4b.



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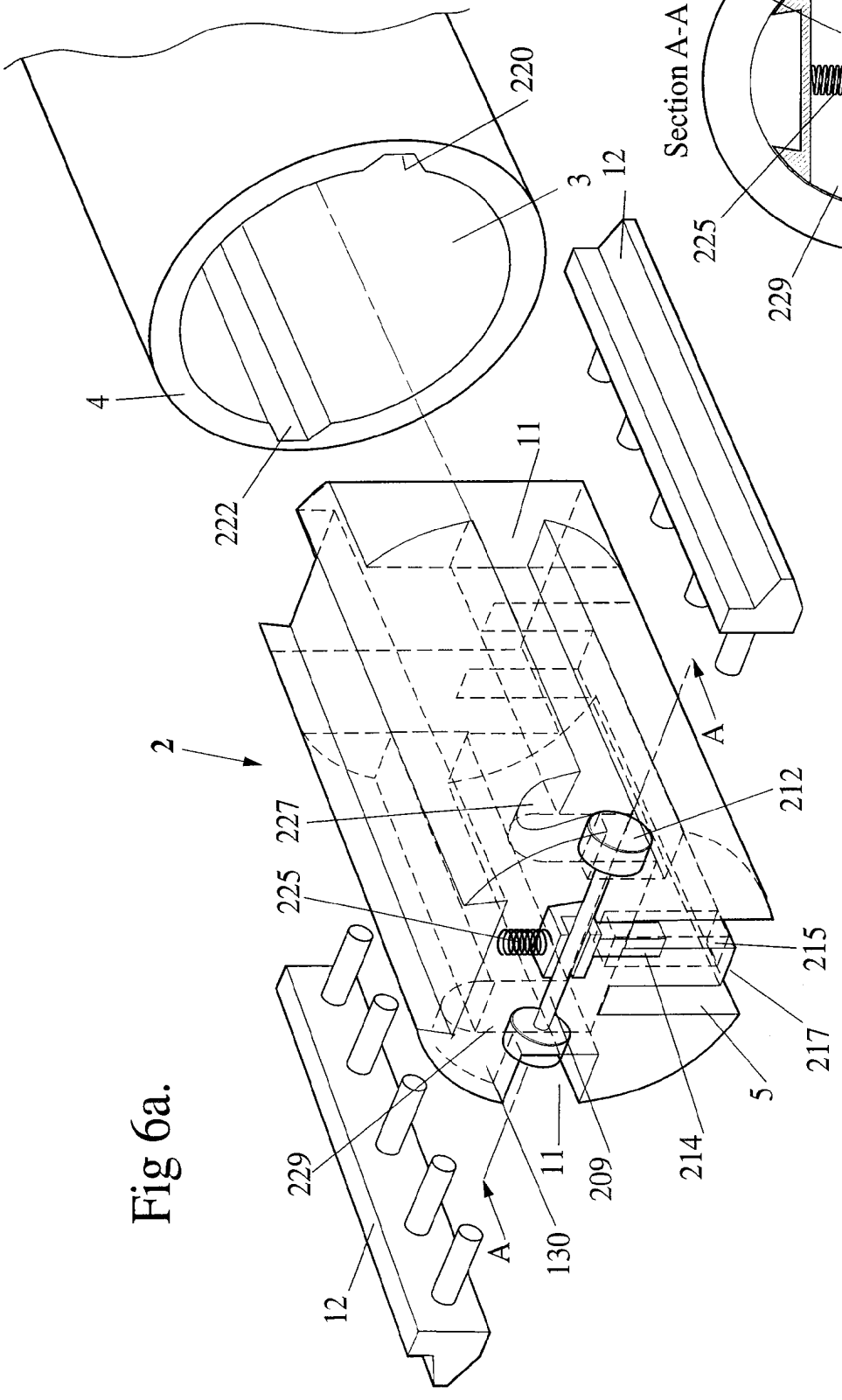
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Fig 6a.

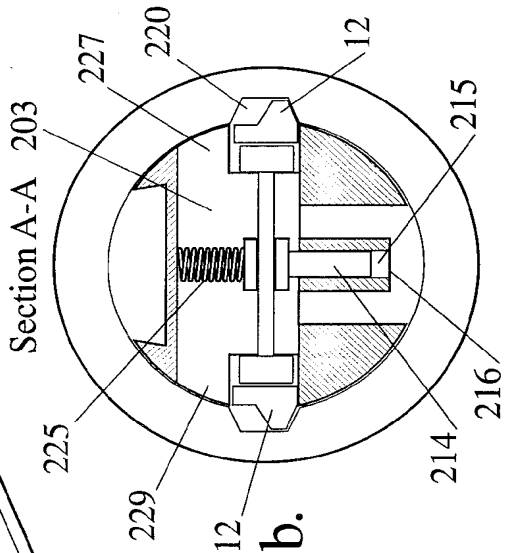
Section A-A
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Fig 6b.

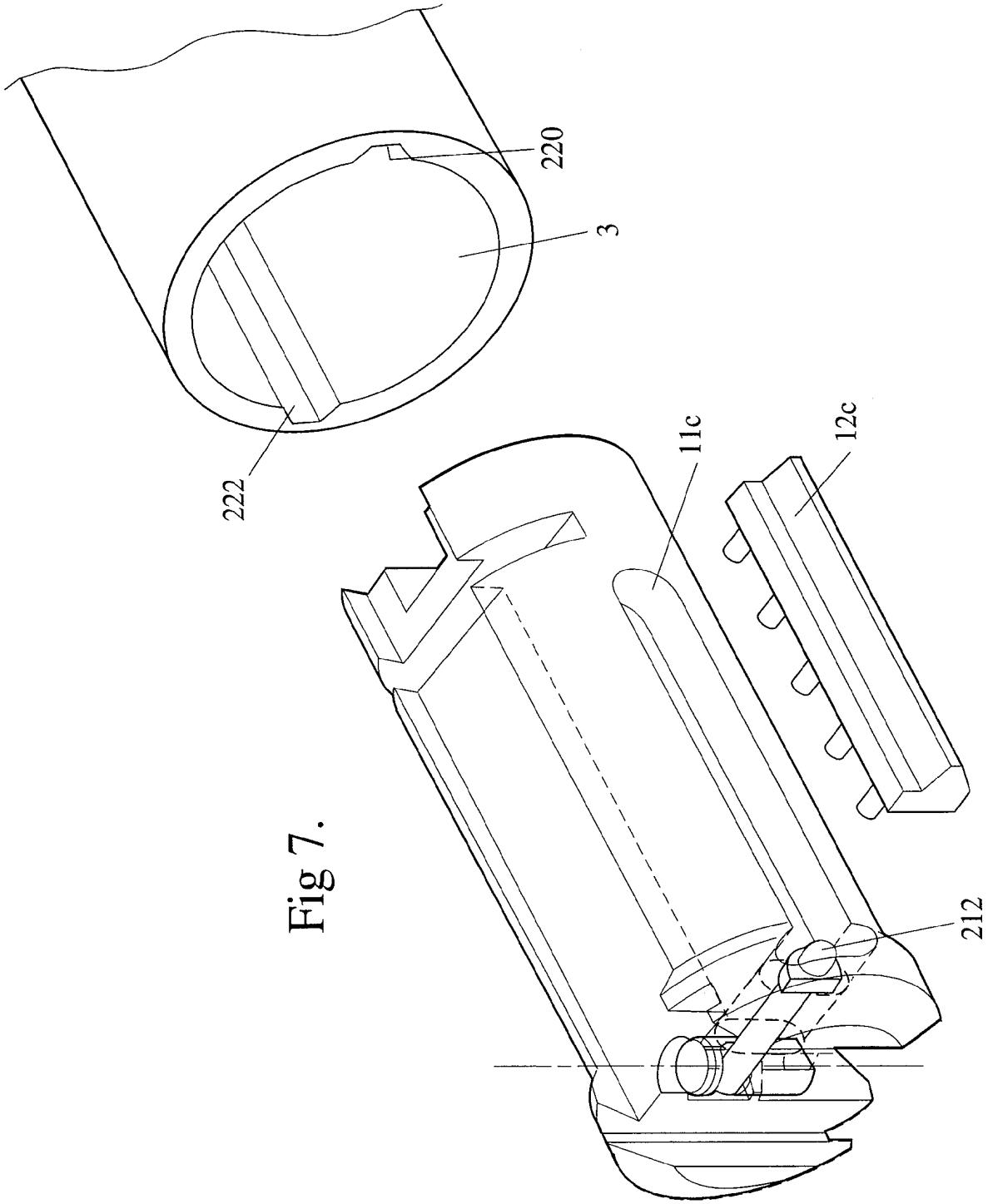


Fig 7.

Fig 9.

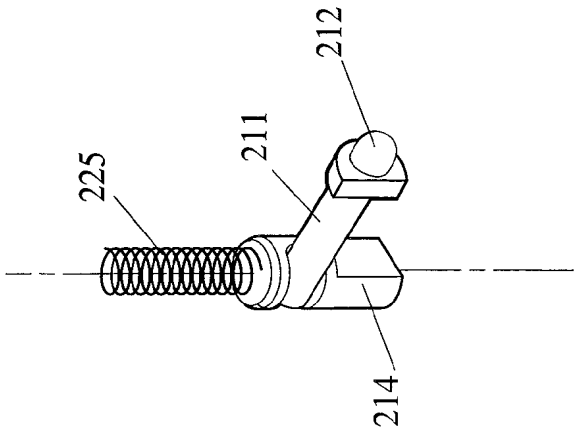
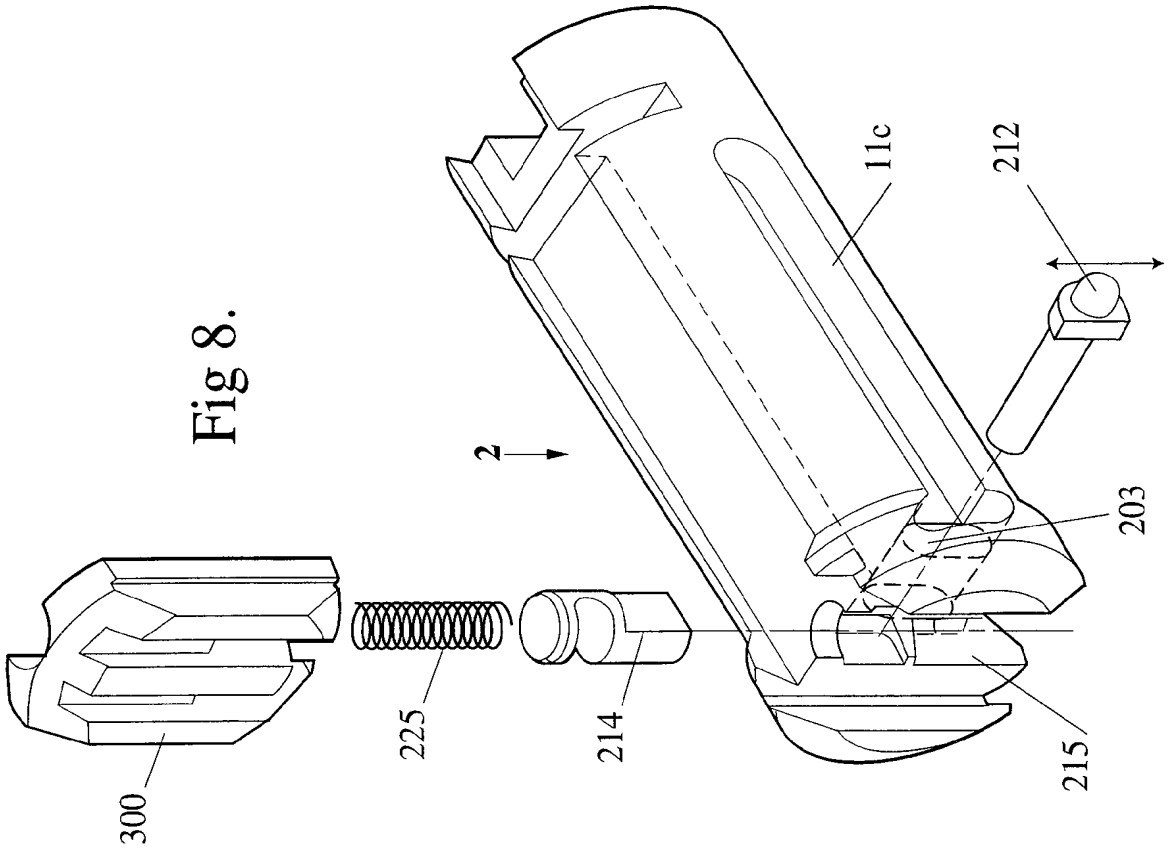


Fig 8.



INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00722

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl[6]: E05B 19/00, 19/04, 27/00, 35/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B 19/00, 19/02, 19/04, 19/06, 27/00, 27/04, 35/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT:E05B 19/- and (handle or actuator)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 262059 A (PROFALUX SA) 30 March 1988 entire document	1-39
X	WO 96/20325 A (BOTTEON) 4 July 1996 entire document	1-39
X	EP 416500 A (COSTRUZIONI s.p.A.) 13 March 1991 entire document	1-39

[X] Further documents are listed in the continuation of Box C

[X] See patent family annex

* Special categories of cited documents:

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"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
15 October 1999

Date of mailing of the international search report
21 OCT 1999

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00722

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4667495 A (GIRARD et. al.) 26 May 1987 entire document	1-39
X	US 5076081 A (BORIS, JR.) 31 December 1991 figure 13	1-39

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU 99/00722

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
EP	262059	FR	2604206				
WO	9620325	AU	4342196	BR	9510220	EP	800605
		IT	940052	US	5724841	WO	9620325
EP	416500	CN	1050073	EP	416500	IT	8903610
		IT	1235586	JP	3119274	PT	95195
		US	5170651	ZA	9006888		
US	4667495	EP	154755	FR	2561294	US	4667495
US	5076081	AU	8012491	CA	2043735	GB	9114726
		GB	2247277	MX	9100101	SG	128594
		US	5010753	US	5076081		

END OF ANNEX